TueA01

Inductively Driven Surface-Plasma Negative Ion Source for N-NBI use

Yuri Belchenko, Grigory Abdrashitov, Peter Deichuli, Alexander Ivanov, Alexander Gorbovsky, Alexey Kondakov, Andrey Sanin, Igor Shikhovtsev, Oleg Sotnikov

Budker Institute of Nuclear Physics of Siberian Branch Russian Academy of Sciences, Novosibirsk, Russia

Corresponding Author: Yuri Belchenko, e-mail address: belchenko@inp.nsk.su

A stable H- beam with a current ~1A, energy 90 kV, and pulse duration up to 7 s was routinely extracted and accelerated from the long-pulse surface-plasma source prototype, developed at BINP for N-NBI use. The H- ions are produced on the hot surface of a plasma grid, covered by cesium and illuminated by fast plasma particles from the inductively driven radio-frequency discharge. A multiaperture, five-electrode ion optical system is used for beam formation. The essential BINP source features are: 1) an active temperature control of the ion-optical system electrodes by circulation of hot thermal fluid through the channels, drilled in the electrode bodies, and 2) the directed cesium deposition to the plasma grid electrode using a long tube, connected to the plasma grid periphery [1]. The long term effect of cesium was obtained just with the single cesium deposition. The high voltage strength of ion-optical system electrodes was considerably improved with actively heated electrodes. The 90 keV H- beam is transported to the entrance of the high-voltage post-accelerator with the help of the low energy beam transport section.

References

[1] Yu. Belchenko, A. Gorbovsky, A. Ivanov, et al. ”Negative ion production in the RF multiaperture surface-plasma source Multiaperture Negative Ion Source”. AIP Conf. Proc. **1655**, 040002 (2015).